Regency ELECTRONICS INC.

REGENCY MODEL TS-1 TURBO-SCANNER

SERVICE MANUAL

7707 RECORDS ST.
INDIANAPOLIS, INDIANA 46226

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IMPORTANT
For details of operation, please consult the Owner's Manual

This manual is a production of Regency's Technical Publications Department.

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INTRODUCTION

Regency Model TS-1 Turbo-Scanner is a 35-channel, state-of-the-art, programmable, double-conversion, superheterodyne receiver. The frequency ranges covered (in MHz) are: 29.94-54; 118-135.975; and 136-174; 406-512.

For details of programming and other operational details, see the Owner's Manual (Regency Part Number 7001-1556-600).

SPECIFICATIONS

Table 1 gives the technical specifications for the unit.
(Subject to change without notice)

Table 1. Specifications

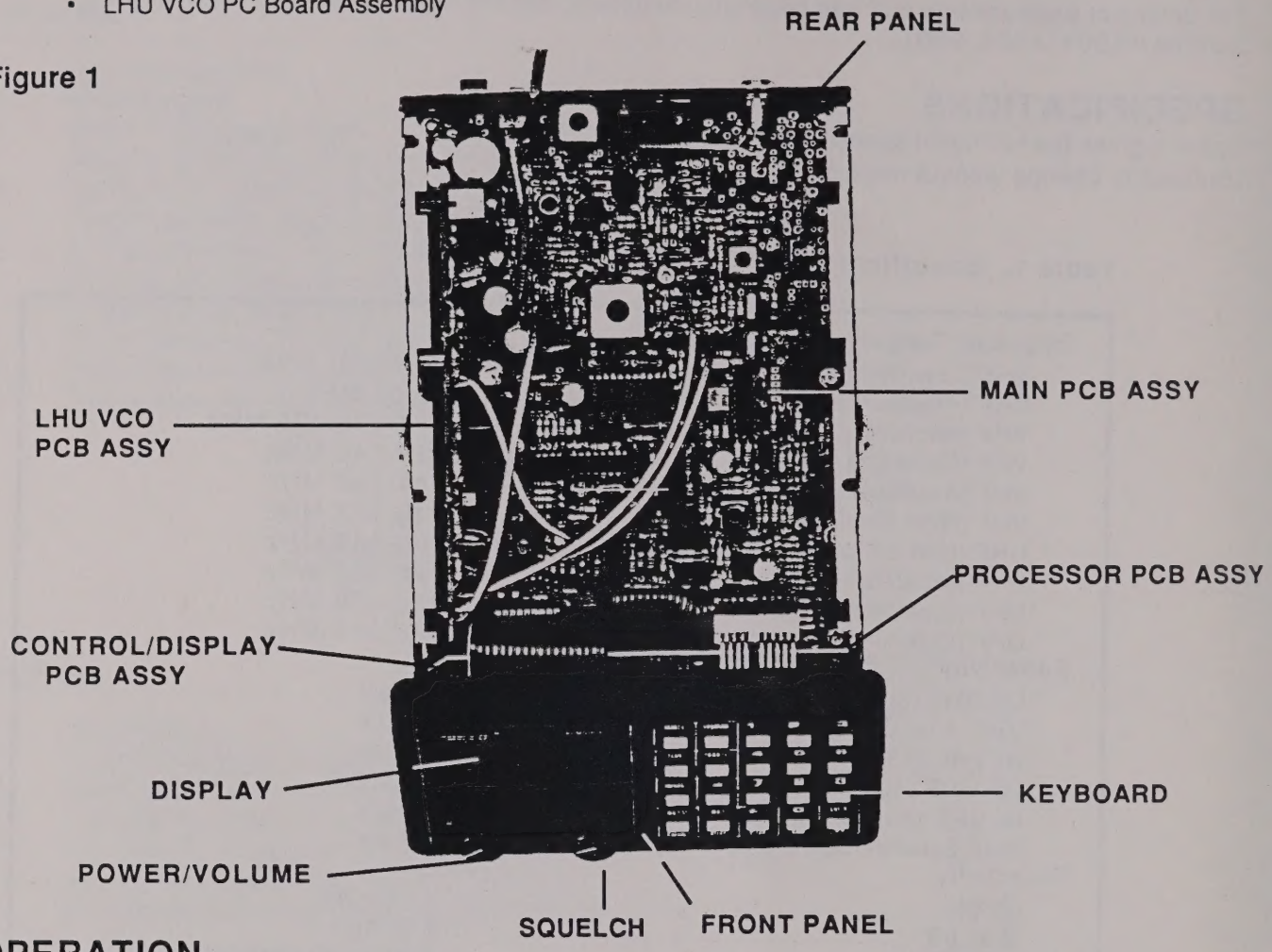
Frequency Ranges:	
VHF (Low Band)	29.94-50 MHz
VHF (Amateur)	50-54 MHz
VHF (Aircraft)	118-135.975 MHz
VHF (Canadian Weather Satellite)	136-144 MHz
VHF (Amateur)	144-148 MHz
VHF (High Band)	148-174 MHz
UHF (Low Band)	406-440 MHz
UHF (Amateur)	440-450 MHz
UHF (Standard)	450-470 MHz
UHF (Extended)	470-512 MHz
Sensitivity (12 DB Sinad; at tune-up)	
LO VHF (30-54 MHz)	0.5 µV
VHF Aircraft (118-136 MHz)	0.8 µV
HI VHF (136-174 MHz)	0.5 µV
LO UHF (406-440 MHz)	0.7 µV
HI UHF (440-470 MHz)	0.7 µV
UHF Extended (470-512 MHz)	0.9 µV
Selectivity	
@6dB	±7.5 KHz
@50 dB	±18 KHz
Scanning Rate	approx. 40 channels/second
Search Rate	approx. 50 channels/second
Audio Output	3 watts @ 10% or less distortion
Priority Sampling Rate	1 sample/2 seconds
Speaker	3.2 Ohm, 4"
Power Requirements	13.8 VDC, 16 Watts, 110-130 VAC, 60 Hz
Size	5 3/4" W x 2 3/8" H x 9 1/4" D
Weight	approx. 3 1/2 lbs.

RECEIVER DETAILS

The major components of the receiver are (see Figure 1):

- Front Panel, including Keyboard, Processor and Control Board
- Rear Panel
- Main PC Board Assembly
- LHU VCO PC Board Assembly

Figure 1



OPERATION

OPERATING PRINCIPLES (See Figure 2, Block Diagram)

The, digitally-synthesized, AM/FM receiver covers the following frequency ranges (MHz): 29.94-54 (Low VHF): 136-174 (High VHF): 406-512 (UHF): and 118-135.975 (Aircraft AM).

Voltage Controlled Oscillator Low VCO is used for the 30-54 MHz range, and Voltage Controlled Oscillator HI VCO, for the 118-174 MHz and 406-512 MHz bands. The CPU determines which VCO is operating at a given time.

The receiver employs two IF circuits, one for each of the following ranges: narrow-band FM and Aircraft band.

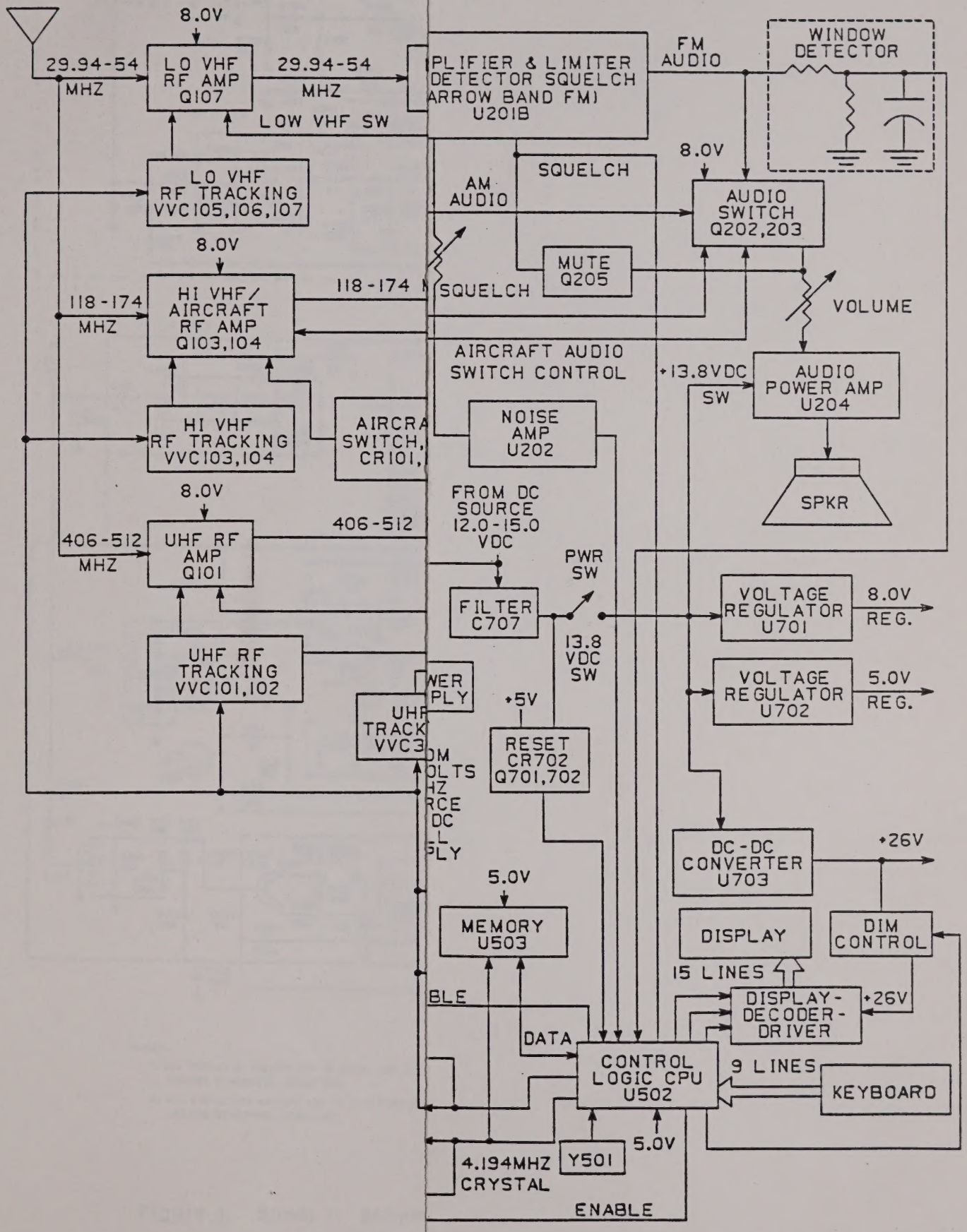

8.0V
29.94-54 MHZ
LO VHF RF AMP Q107
29.94-54 MHZ
LOW VHF SW
PLIFIER & LIMITER DETECTOR SQUELCH ARROW BAND FM) U201B
FM AUDIO
WINDOW DETECTOR
LO VHF RF TRACKING VVC105,106,107
AM AUDIO
SQUELCH
8.0V
AUDIO SWITCH Q202,203
8.0V
118-174 MHZ
HI VHF/ AIRCRAFT RF AMP Q103,104
118-174
SQUELCH
MUTE Q205
VOLUME
AIRCRAFT AUDIO SWITCH CONTROL
+13.8VDC SW
AUDIO POWER AMP U204
HI VHF RF TRACKING VVC103,104
NOISE AMP U202
SPKR
8.0V
406-512 MHZ
UHF RF AMP Q101
406-512
FROM DC SOURCE 12.0-15.0 VDC
PWR SW
FILTER C707
VOLTAGE REGULATOR U701
8.0V REG.
13.8 VDC SW
UHF RF TRACKING VVC101,102
VOLTAGE REGULATOR U702
5.0V REG.
+5V
RESET CR702 Q701,702
DC-DC CONVERTER U703
+26V
5.0V
MEMORY U503
DISPLAY
DIM CONTROL
15 LINES
DISPLAY-DECODER-DRIVER
+26V
DATA
CONTROL LOGIC CPU U502
9 LINES
KEYBOARD
5.0V
4.194MHZ CRYSTAL
Y501
ENABLE

Figure 2. B

RECEIVER DETAILS

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- Rear Panel
- Main PC Board Assembly
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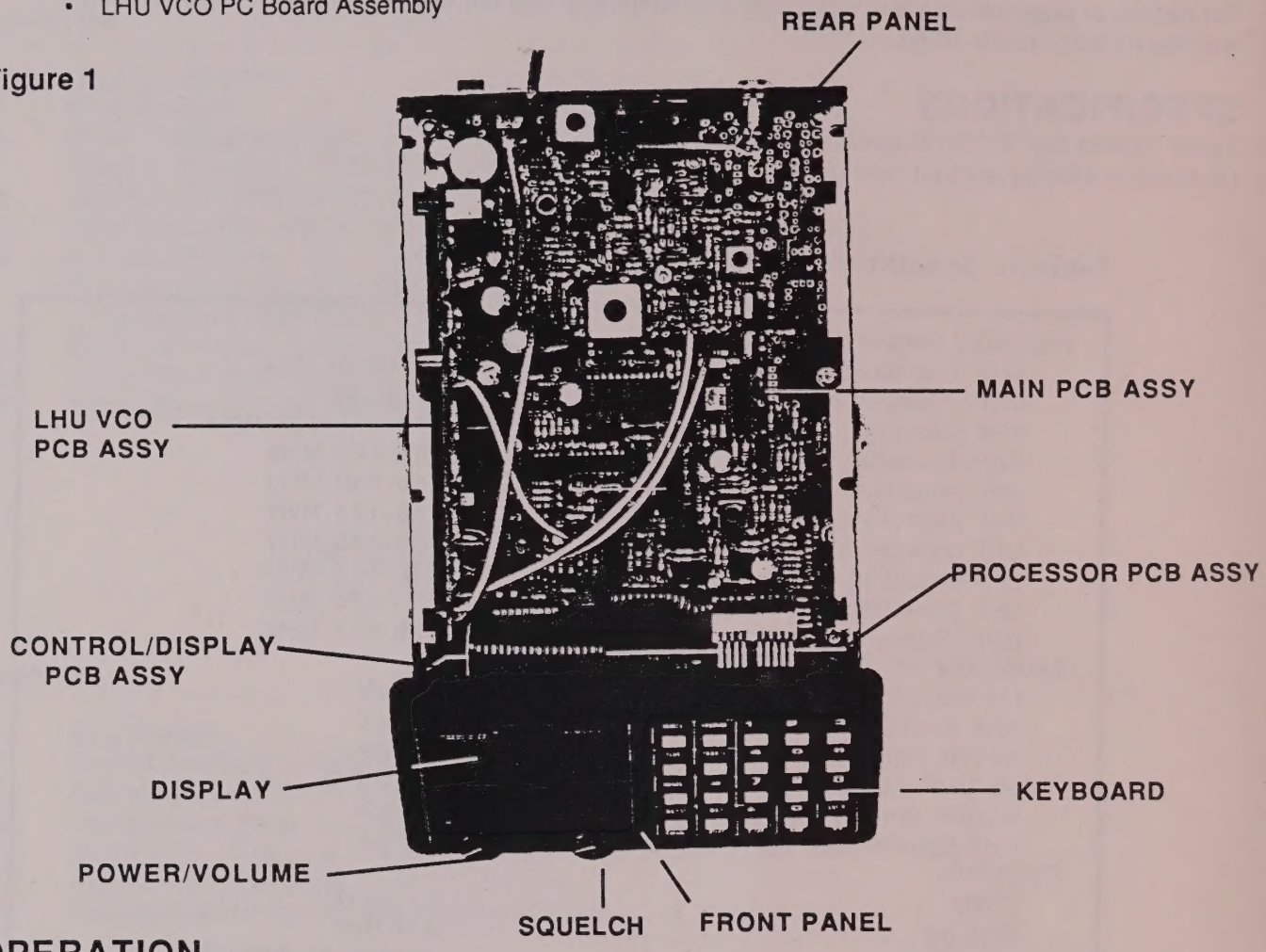
Figure 1



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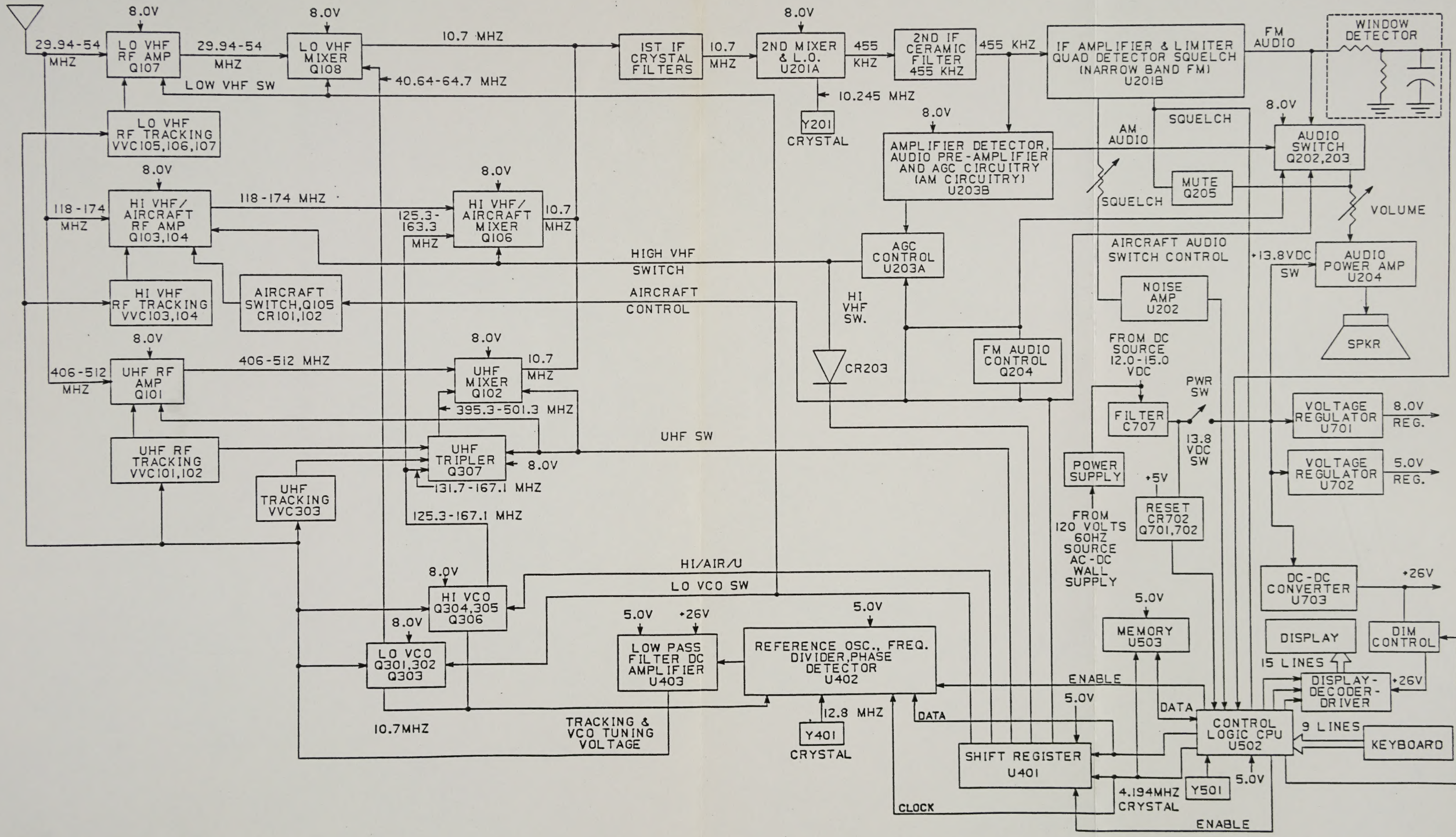
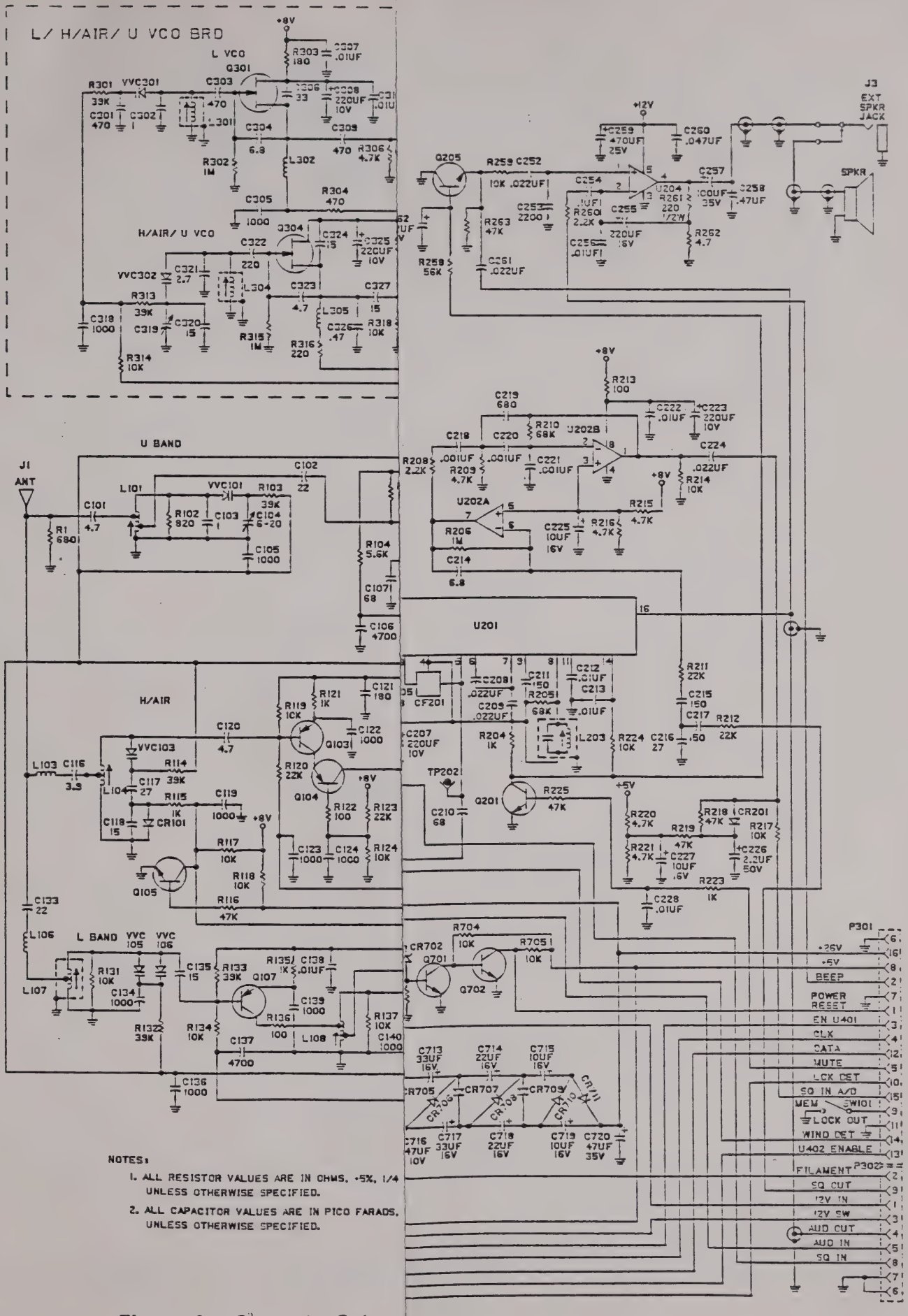


Figure 2. Block Diagram



NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS, ±5%, 1/4 UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN PICO FARADS, UNLESS OTHERWISE SPECIFIED.

Figure 3. Sheet 1: Schem

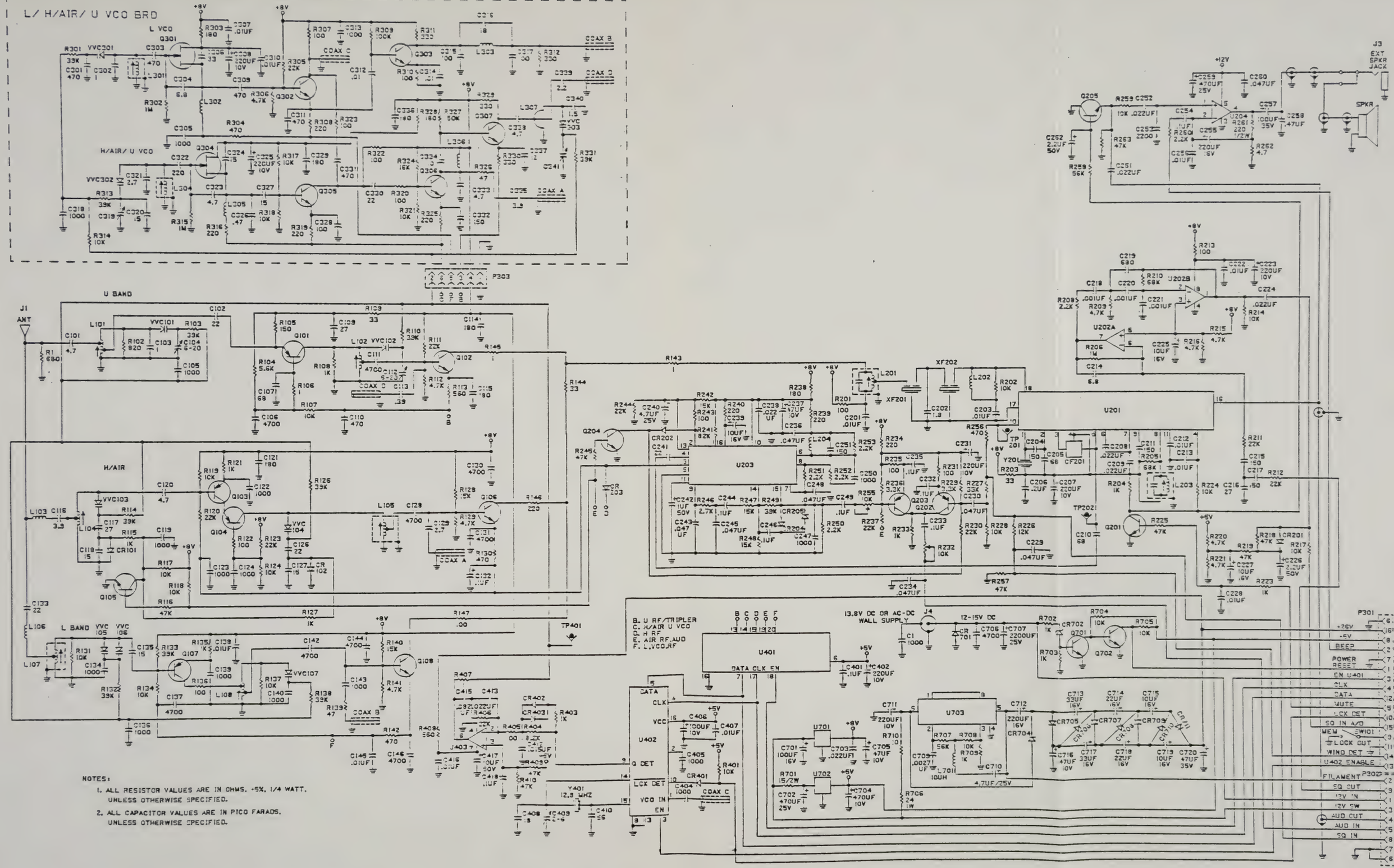


Figure 3. Sheet 1: Schematic, Main

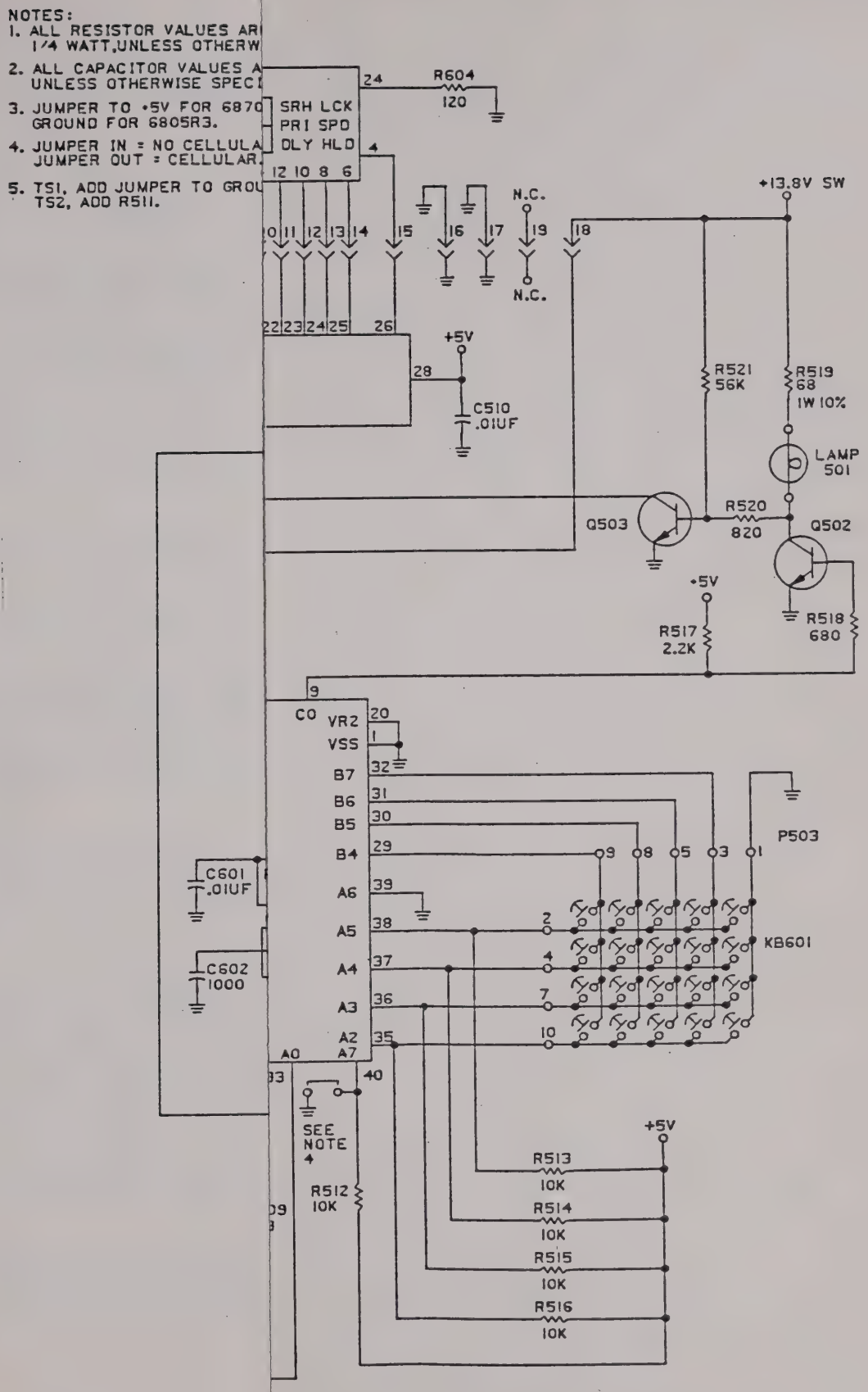


Figure 3. Sheet 2: Schematic

NOTES:
1. ALL RESISTOR VALUES ARE IN OHMS, ±5%, 1/4 WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN PICO FARADS, UNLESS OTHERWISE SPECIFIED.
3. JUMPER TO +5V FOR 68705R3. JUMPER TO GROUND FOR 6805R3.
4. JUMPER IN = NO CELLULAR. JUMPER OUT = CELLULAR.
5. TS1, ADD JUMPER TO GROUND. TS2, ADD R511.

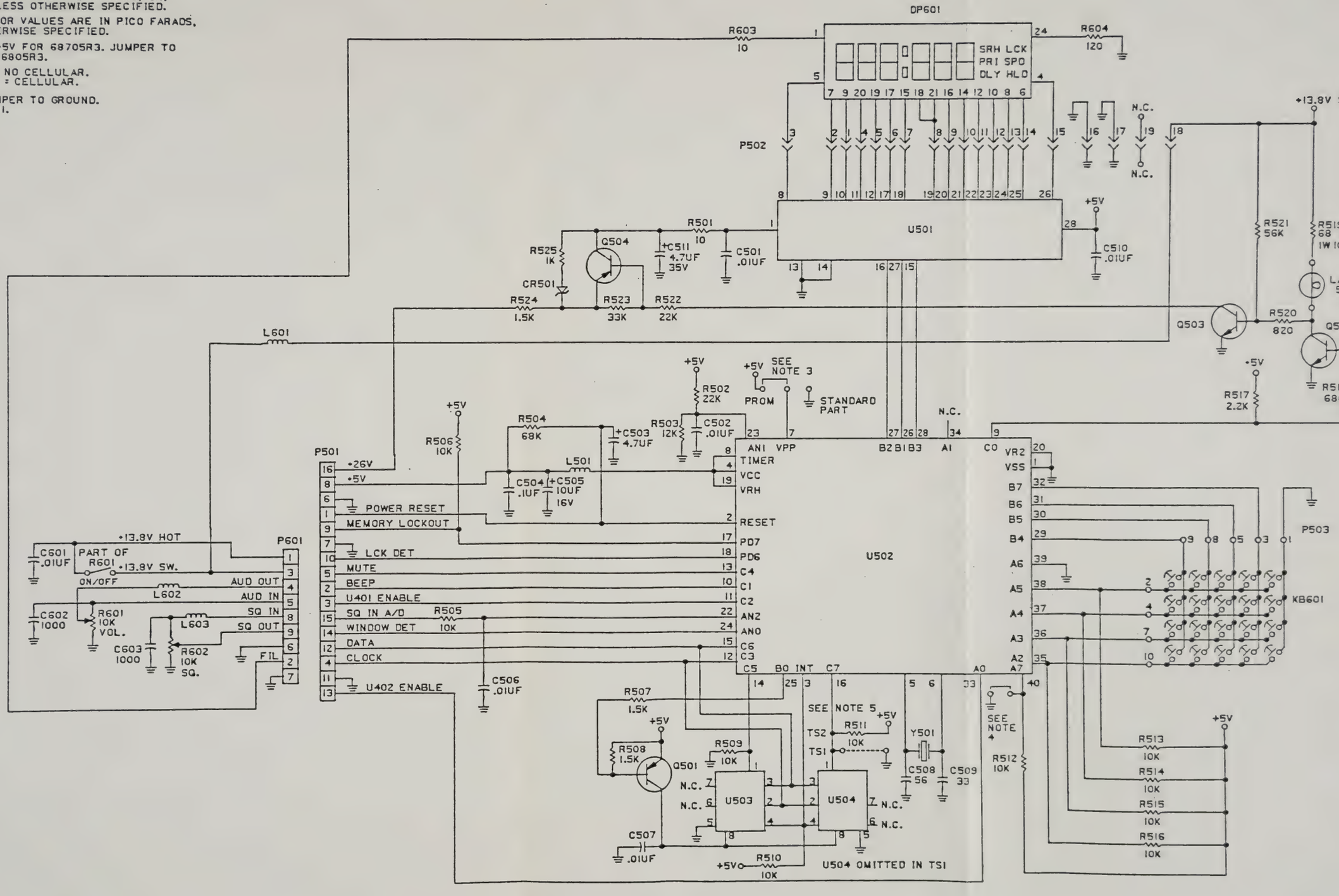


Figure 3. Sheet 2: Schematic, Processor/Control

The CPU controls RF band and VCO selection, and activation of IF/audio circuitry.

Refer to the Schematic, Figure 3, for details.

CIRCUIT DESCRIPTION

UHF, RF and Mixer

The UHF RF amplifier, mixer, and tripler are turned on by the voltage at Pin 13 of **U401** going to a *low* value (near 0V).
The antenna input coil **L101** is tuned by **VVC101** and **C104**. Tracking voltage is applied to **VVC101** to tune the circuit to the RF receive frequency.

The RF output coil **L102** is tuned by **VVC102** and **C112**. Tracking voltage is applied to **VVC102** to tune the circuit to the RF receive frequency. The RF signal is coupled to the base of the UHF mixer. Also coupled to the base of the UHF mixer is the local injection frequency.

The injection frequency originates at the HI VCO. The RF from the HI VCO is *tripled* by **Q307**. The result is a frequency that is three times the frequency of the HI VCO. This is the correct frequency for UHF local injection.

Tracking voltage is applied to **VVC303** in the tripler collector circuit. The tracking voltage tunes these circuits to maintain the proper injection across the UHF band.

The 10.7 MHz first IF frequency appears at the collector of the UHF mixer **Q102**.

HI VHF/Aircraft, RF and Mixer

During reception of HI VHF frequencies, the HI VHF/Aircraft RF amplifier and mixer are turned on by the voltage at Pin 15 of **U401** going to a *low* value. When receiving Aircraft frequencies, the circuits are turned on by a low voltage from the AGC circuit at Pin 3 of **U203**. The voltage at Pin 3 of **U203** will be low and depend on the signal strength. The voltage will increase as the received signal strength increases.

The antenna input circuit consists of **L104**, **VVC103**, **C117** and **C118**. Tracking voltage is applied to VVC103 to tune the circuit to the RF receive frequency. The output circuit consists of **L105**, **VVC104**, **C126** and **C127**. Tracking voltage is applied to **VVC104** to tune the circuit to the operating frequency.

During reception of HI VHF, all of the tuning capacitors are active in the circuit. While receiving Aircraft frequencies, the Aircraft segment switch **Q105** is turned off by a low voltage from Pin 19 of **U401**. The resulting voltage at the collector of **Q105** applies forward conduction bias to diodes **CR101** and **CR102**. The diodes become the equivalent of a short circuit across **C118** and **C127**, removing them from the tuned circuits. The result is an increase in the effective capacity in the circuits, and the circuits are tuned to the Aircraft band frequencies.

The RF signal is coupled to the input of a *cascode* amplifier (consisting of **Q103** and **Q104**) and then to the base of the mixer **Q106**. Also coupled to the base of **Q106** is the local injection frequency.

The local injection frequency originates at the HI VCO **Q304**. The signal from the HI VCO buffer **Q306** is applied to the mixer **Q106** for injection. Tracking voltage is applied to the tuned circuit in the collector of **Q104** to maintain proper injection voltage across the HI VHF and Aircraft bands.

The 10.7 MHz first IF frequency appears at the collector of the mixer **Q106**.

Low VHF, RF and Mixer
The Low VHF RF amplifier and mixer are turned on by a *low* (near ground) voltage at Pin 20 of **U401**.

The signal from the antenna is coupled to a tuned circuit consisting of **L107**, **VVC105**, **VVC106** and **C134**. Tracking voltage is applied to **VVC105**, **VVC106** and **C134** to tune the circuit to the RF receive frequency. The signal is coupled to the base of the RF amplifier **Q107**. The tuned circuit in the collector circuit of **Q107** consists of **L108**, **C140** and **VVC107**. Tracking voltage is applied to **VVC107** to tune the circuit to the RF receive frequency.

The RF signal is coupled to the base of the mixer **Q108**. Also coupled to the base of **Q108** is the injection signal. The local injection frequency for low VHF is obtained directly from the Low VCO, **Q301** and buffer **Q303**.

The 10.7 MHz first IF frequency appears at the collector of **Q108**.

Public Service Bands IF
The collectors of all three Public Service Bands mixers are connected together. The 10.7 MHz first IF frequency appearing at *any* of these mixers is coupled through a two-section, narrow-band, crystal filter (**XF201** and **XF202**) to the public service FM IF subsystem at Pin 18 of **U201**. Between Pins 18 and 3 is a mixer for converting the 10.7 MHz first IF signal to the 455 KHz second IF frequency. The 10.245 MHz injection frequency is obtained from a crystal oscillator **Y201** connected to Pin 1 of **U201**. The 455 KHz second IF signal at Pin 3 is passed through a narrow-band ceramic filter **CF201** to Pin 5 of **U201**. Between Pins 5 and 10 of **U201** are amplifiers, limiters and a quadrature detector. The quadrature coil associated with the detector is connected to Pin 8 of **U201**. The audio output appears at Pin 10 of **U201**, and is coupled to squelch and the base of **Q202**.

Aircraft Band IF
During reception of Aircraft frequencies, the AGC circuit turns on the HI VHF/Aircraft section, and controls the gain of these stages. The AGC portion of the Aircraft IF subsystem is enabled by a diode (**CR202**). The 10.7 MHz first IF signal at the collector of mixer **Q106** is coupled through narrow-band crystal filters **XF201** and **XF202** to the input of the public service FM IF subsystems at Pin 18 of **U201**. Between Pins 18 and 3 is a mixer for converting the 10.7 MHz first IF signal to the 455 KHz second IF frequency. The 10.245 MHz injection frequency is obtained from a crystal oscillator circuit between Pins 1 and 2 of **U201**. The 10.245 MHz crystal is connected to Pin 1. The 455 KHz signal at Pin 3 is passed through a narrow-band ceramic filter **CF201** to Pin 5 of **U201**. At this point, the 455 KHz IF signal is coupled to the input of the Aircraft IF subsystem at Pin 4 of **U203**.

Between Pins 4 and 6 of **U203** is an amplifier. The output of the amplifier at Pin 6 is coupled to the input of an AM detector at Pin 8. The audio output from the detector at Pin 9 is filtered and then coupled to the input of an audio amplifier at Pin 14. The output of the audio amplifier appears at Pin 15 of **U203**. The diodes **CR204** and **CR205** connected across the audio amplifier (through **C246**) act as noise limiters. The audio signal at Pin 15 of **U203** is coupled to the base of **Q203** which is used as an audio switch.

Public Service and Aircraft Band Squelch
The audio output of **U201** at Pin 10 is coupled to the input of the audio switch **Q202**. The signal at the base of **Q203** will be audio when receiving Aircraft band.

Pin 10 of **U201** is connected to the *high* end of the squelch control. The arm of the squelch control is coupled to the dual-amplifier **U202**. The values in this circuit are chosen as to limit the response to approximately 5-25 KHz. The noise occurring in this range is amplified and coupled to the noise rectifier **CR201**. The DC output voltage from the detector is connected to the input of microprocessor **U502**. When a signal is received, the noise is reduced. The DC output from the processor at Pin 13 will change from a high to a low voltage. The mute output is connected to the mute line at Pin 5 of **P301**. The mute line controls the internal mute circuit in **U201** and mute transistor **Q205**.

Frequency-determination
Frequency and band information originates in the microprocessor **U502**.

The output frequencies of the VCO's are coupled to Pin 1 of the synthesizer **U402**. The synthesizer uses the data signal to determine the amount of frequency division required to produce the necessary reference signal.

The synthesizer compares the signal from the VCO input at Pin 1 of **U402** with its internal reference derived from the crystal oscillator Y401 between Pins 14 and 15 of **U402**. An *error* voltage is produced at Pin 9 of **U402**. The *error* voltage is applied though a low-pass filter to the input of a DC amplifier (Pin 2 of **U403**). The amplified DC voltage at Pin 6 of **U403** is applied to the varactors in the VCO circuits **VVC301**, **VVC302** and **VVC901** to adjust the VCO to the correct frequency. The same DC voltage at Pin 6 of **U403** is used as the RF tracking voltage. If the correct frequency has been established, Pin 10 of **U402** will be *low.* This signal is sent to the processor to confirm that the system is **locked.** Pin 10 of **U402** will go *high* (near 5V) if the system does not lock.

Band Selection
Bands are selected by **U401**.

The Low VHF RF (29.94-54 MHz) VCO is selected by a *low* (near 0V) at Pin 20 of **U401**.

The Hi VHF RF (136-174 MHz) is selected by a *low* at Pin 15 of **U401**. The high-band VCO is selected by a *low* at Pin 14 of **U401**. Note that the high-band VCO is also used for Aircraft and UHF band VCO's.

The Aircraft band is turned on by the AGC circuit in **U203**. The AGC circuit (Pins 2, 3, and 13 of **U203**) is enabled by the diode **CR202**. The voltage rise at Pin 2 of **U203** will cause the voltage at Pin 3 to go to a *low* value and turn on the HI VHF/Aircraft amplifier and mixer. The voltage at Pin 3 of **U203** will be low, increasing with the strength of the received signal. The result is a control of the gain in the RF and mixer circuits. Diode **CR203** prevents the *high* (near 5V) voltage at the HI VHF switch (Pin 15 of **U401**) from reaching Pin 3 of **U203**. The high-band VCO is enabled by a *low* at Pin 14 of **U401**.

The UHF band RF is selected by a *low* at Pin 13 of **U401**. The VCO is selected by a *low* at Pin 14 of **U401**.

Audio Switching

The Public Service audio FM is applied to the input of an audio switch **Q202**. The output from the switch appears at the volume control.

Aircraft audio (AM) is applied to the base of audio switch **Q203**. The output from the switch appears at the volume control.

Audio Amplifier

The audio from the arm of the volume control is coupled to the input of the audio amplifier at Pin 1 of **U204**. Also coupled to PIN 2 of the audio amplifier is the *beep* output from microprocessor **U502**.

The *beep* signal is coupled through **R260** and **C254**. The volume of the *beep* may be reduced by increasing the value of **R260**. Removing **R260** will eliminate the *beep*.

The output of the audio amplifier at Pin 4 is coupled through the external speaker jack to the internal speaker. Plugging in an external speaker disconnects the internal speaker.

For the external speaker, we recommend an impedance of **8 Ohms** for optimum performance.

Microprocessor and Memory

The microprocessor **U502** contains a crystal oscillator **Y501** between Pins 5 and 6. The oscillator runs at 4.194304 MHz.

The processor receives channel frequency information from the keyboard. This information is stored in the memory of **U503**, an **EAROM** capable of retaining information for a long time (estimated at 10 years) without the need for a battery backup.

Display

The vacuum fluorescent display is turned on by signals originating at the microprocessor. The segments and digits are turned on by **U501**.

The filament is powered by 3.4 VAC from the DC-DC converter (**U703**).

OPERATING CONTROLS AND PROCEDURES

See the Owner's Manual (Regency Part No.7001-1556-600) for details.

MAINTENANCE

NOTE: Adjustments and alignments described in the following sections are made on the Main and VCO PC Board Assemblies.

Accessing PCB Assemblies

Remove five attaching screws from bottom of unit. Gently lift top off and lay it next to the unit. All the PCB assemblies are now exposed.

Adjustments

NOTE: Consult Figures 4 and 5 during these procedures.

Equipment Required

FM Signal generator
AC Voltmeter (455 KHz Capability)
Frequency Counter
DC Voltmeter (Preferably Digital)
Sinadder

VCO

1. Program 29.94 MHz into Channel 1.

2. Tune **L301** so that **TP 401** reads between 0.9 and 1.2 Volts.

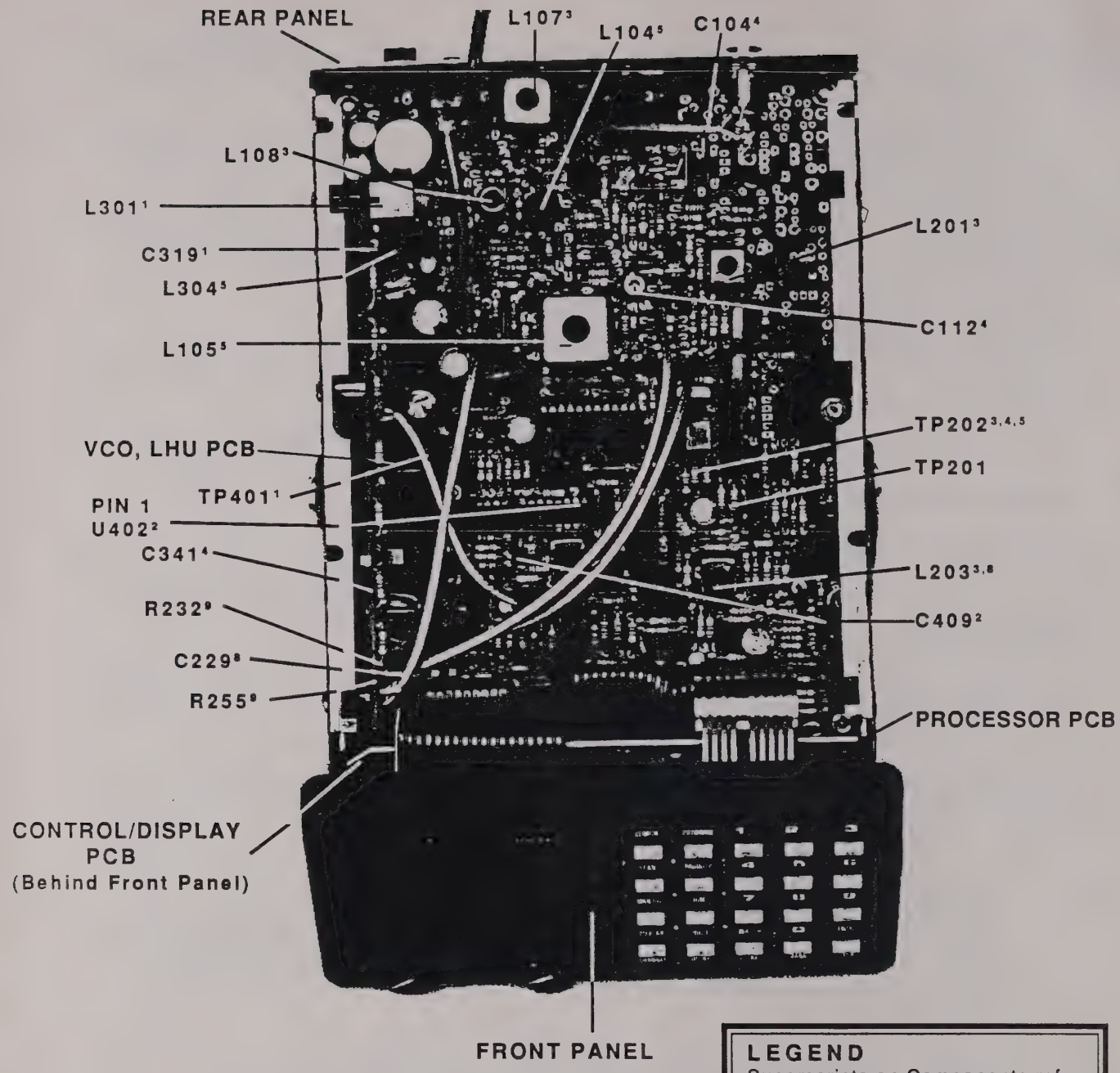
3. Program 53.9 MHz into Channel 2. The voltage at **TP 401** should read 13.8-15.0 Volts. If voltage is *below* 13.8V, go to Step 2 and tune **L301** toward 1.2V. If voltage reads *above* 15.0 V, go to Step 2 and tune **L301** to 0.9V.

4. Program 136.1 MHz into Channel 3. Set **L304** slug flush, then turn two turns *inward*. Tune **C319** for maximum tuning voltage. Tune **L304** for a voltage of 1-1.2V.

5. Program 511.975 MHz into Channel 4. Tuning voltage should be between 13.9 and 14.4 Volts. If the voltage at **TP 401** is *below* 13.9V, see **5A**. If the voltage is *above* 14.4V, see **5B** below.

   A. If tuning voltage in Step 5 reads too *low*, proceed as follows:
   Push 3, then MANUAL. Display should read 136.1 MHz.
   Tune **C319** so that the voltage drops to 0.9V. Tune **L304** for a tuning voltage of 1-1.2V. Push 4, then MANUAL. Display should read 511.975 MHz. The tuning voltage should measure between 13.9 and 14.4V. If the tuning voltage still measures too *low*, repeat Step **5A**.

   B. If tuning voltage in Step 5 reads too *high*, proceed as follows:
   Push 3, then MANUAL. Display should read 136.1 MHz. Tune **C319** so that tuning voltage goes to 1.4V. Tune **L304** for a tuning voltage of 1-1.2V. Push 4, then MANUAL. Display should now read 511.975 MHz. Tuning voltage should measure between 13.9 and 14.4V. If tuning voltage is still too *high*, repeat Step **5B**.



LEGEND

Superscripts on Components refer to Adjustment Procedures in which they are called out in the text.

1. VCO
2. Netting
3. Receiver, Low VHF Band
4. Receiver, UHF Band
5. Receiver, High VHF Band
8. Window Detector
9. Audio Power

Figure 4. Components called out in Adjustment/Alignment Procedures

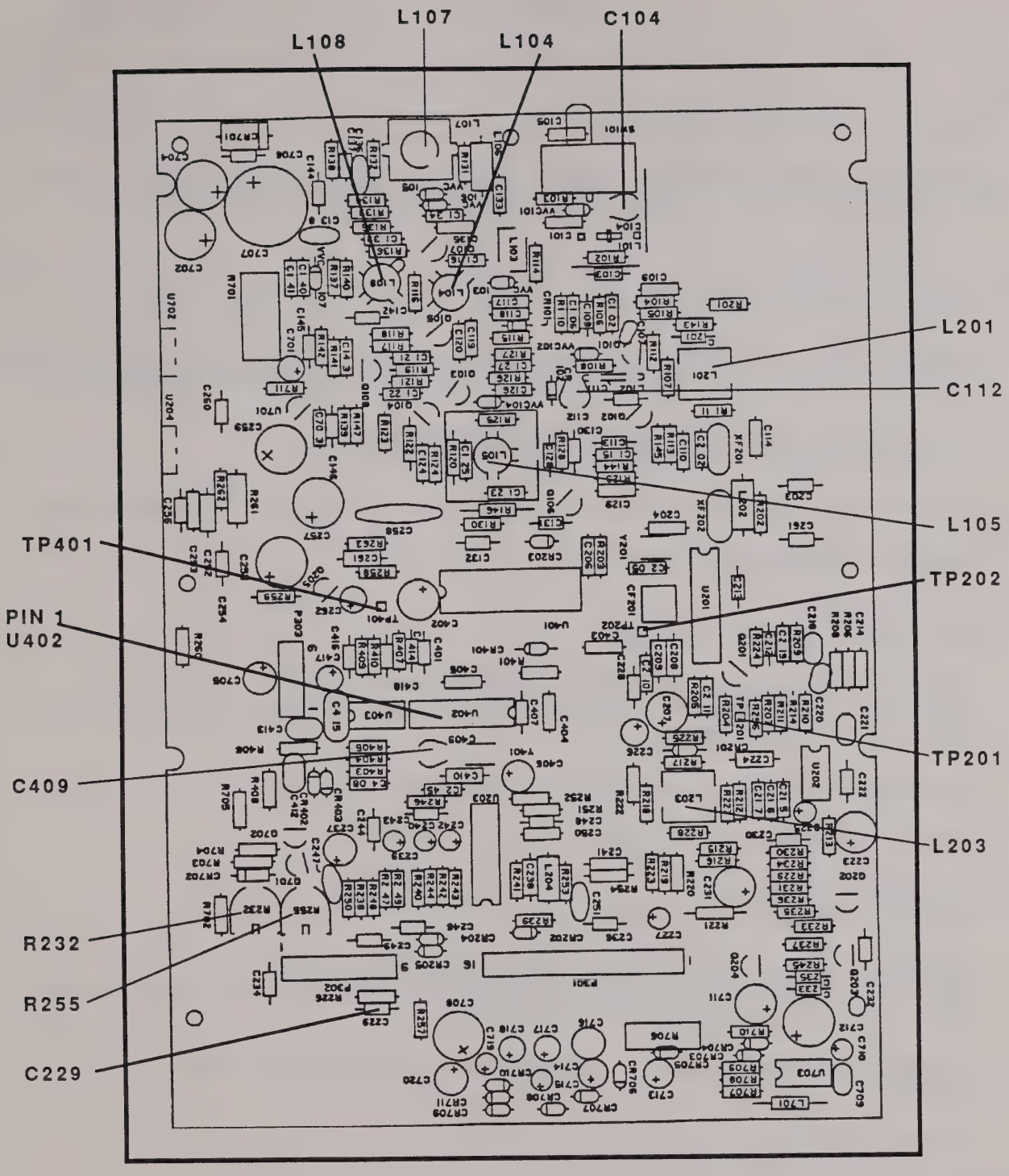


Figure 5. Parts Placement, Main Board; with callouts (See Figure 4 also).

Netting

1. Program 41.3 MHz into Channel 6.

2. Adjust **C409** (U402) for a frequency of 52.000 MHz (±30Hz) at **Pin 1, U402.** (Use AC coupling to the Frequency Counter.) **NOTE**: 52.000 MHz=41.3 MHz + 10.7 MHz.

Receiver (Low VHF Band)

1. Program 39.9 MHz into Channel 7.

2. With Signal Generator (no modulation) accurately set on frequency, very carefully tune **L201** for **maximum** signal at **TP 202**. If necessary, reduce Generator output for proper tuning.

3. Tune **L107** and **L108** (in that order) for **maximum** signal at **TP 202.** If necessary, reduce Generator output to properly peak these coils.

4. Modulate signal with 1 KHz modulation, 3 KHz deviation. Tune **L203** for **maximum** audio.

5. Measure 12 dB Sinad (0.5µV or less).

Receiver (UHF Band)

1. Program 406.1 MHz into Channel 8.

2. Accurately set Signal Generator to 406.1 MHz without modulation. Adjust **C341**, **C104** and **C112** (in that order) for **maximum** signal at **TP 202.** Repeat until no further improvement results.

3. Modulate signal with 1 KHz modulation, 3 KHz deviation.

4. Measure 12 dB Sinad (0.7µV or less).

Receiver (High VHF Band)

1. Program 159.93 MHz into Channel 9.

2. With Signal Generator (no modulation) accurately set on frequency, tune **L104** and **L105** (in that order) for **maximum** signal at **TP 202**. Reduce Generator output, if necessary, to properly peak these coils.

3. Accurately set Signal Generator on frequency with 1 KHz modulation, 3 KHz deviation.

4. Measure 12 dB Sinad (0.5µV or less).

Receiver (Aircraft Band)

1. Program 118.7 MHz into Channel 10.

2. Modulate signal with 1 KHz tone, 60% AM modulation.

3. Measure 12 dB Sinad, 0.8μV or less. (No tuning is required.)

Window Detector

1. Push 9, then MANUAL. Display should read 159.93 MHz.

2. With Signal Generator (no modulation) accurately set to exact frequency and -30 dBm, tune **L203** so that DC voltage at **C229** is 2.60V.

Audio Power

FM: Go to Ch.9 (159.93 MHz). Set Signal Generator to -50 dBm, 1KHz tone, 3KHz deviation. Then adjust **R 232** for 3.1V across speaker.

AM: Go to Ch.10 (118.7 MHz). Set Signal Generator to -50 dBm, 1 KHz tone, 60% AM modulation. Then adjust **R 255** for 3.1V across speaker.

TABLE 2. NORMAL OPERATING VOLTAGES

The following table lists normal operating voltages for transistors, and integrated circuits grouped in terms of functions. Voltages are in *volts DC*. Measurements are taken with a DVM with 13.8 VDC input and no volume (Volume Control set for minimum audio output).

A. Main Board and VCO Board

Transistors

Transistor	B	E	C
Low VHF Band RF			
Q107	2.14	2.91	0.52
Q108	1.85	1.14	7.75
Low VHF Band VCO			
Q301 (FET)	7.48**D**	1.74**S**	0**G**
Q302	1.35	1.07	7.86
Q303	1.58	0.83	2.72
High VHF Band RF			
Q103	5.87	6.58	3.29
Q104	2.58	3.29	0
Q105	0.60	0	0.04
Q106	1.90	1.20	7.76
High VHF, AIRCRAFT & UHF VCO			
Q304 (FET)	7.1**D**	1.75**S**	0**G**
Q305	3.31	2.70	7.45
Q306	2.92	2.24	8.1
UHF Band RF			
Q101	5.81	6.60	0
Q102	1.37	0.68	8.04
Q307	2.40	1.70	6.60

Transistors (Continued)

Transistor	B	E	C
Aircraft Band RF			
Q103	6.03	6.75	3.28
Q104	2.56	3.28	0
Q105	0	0	1.05
Q106	1.92	1.2-2.0*	8.0
FM Audio			
Q204	0.55	GND.	0
Q202	6.53	7.15	2.77
Q203	7.26	7.43	2.77
AM Audio			
Q204	0	GND.	7.37
Q202	7.40	7.40	2.95
Q203	6.50	7.11	2.95
U502-Reset			
Q701	0.81	GND	0
Q702	0	GND.	5.01
Audio Mute			
Q201 UNSQUEL.	0.65	GND.	0.14
SQUEL.	0	GND.	7.17
Q205 UNSQUEL.	0.14	0	GND.
SQUEL.	0.56	0	GND.

*Varies with AM Signal Strength

Voltage Regulators (DC Input=13.8V; No Volume)

	In	Gnd.	Out
U702, 5V	11.80	GND.	4.94
U701, 8V	13.80	GND.	8.13

Integrated Circuits

Pin No.	Audio Amp U204	AM IF U203	Synthesizer U402	Low Pass Filter U403	DC-DC Converter U703	FM IF U201	Noise Amp U202
1	1.41	1-.4*	3.0	NC	1.16	7.73	4.05
2	0.83	1.7-1*	3.05	2.51	0	7.29	4.05
3	GND.	1.1-2*	0(ENABLE)[a]	2.51	0	7.45	4.05
4	6.40	0.57	0(CLOCK)[a]	GND.	GND.	7.76	GND.
5	13.8	GND.	0(DATA)[a]	NC	4.77	1.04	4.04
6		5.57	NC	(0.9-15V)**	9.75	1.04	4.05
7		1.38	NC	23-34**	4.89	1.03	4.02
8		1.40	GND.	NC	1.16	7.75	8.04
9		0.75	2.50			3.95	
10		5.61	0(LOCK); 5(UNLOCK)			3.26 NO SIGNAL	
11		0.78	NC			1.02	
12		0.38	NC			NC	
13		1.77-1*	GND.			NC	
14		0.69	2.19			UNSQ./SQ. 0.14/76	
15		2.67	2.0			NC	
16		5.27	5.03			0	
17						GND.	
18						2.0	

NC=No Connection; * Varies with AM Signal Strength; **Varies with frequency; [a]

U401

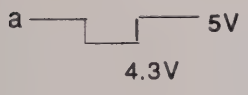
Pin	Volts DC	Pin	Volts DC
1	NC	12	8.0 (L,H,U Bands)
2	NC	13	.28 (U Band); 7.5 (L,H Bands)
3	NC	14	1.0 (H,A, U Bands); 3.8 (L Band)
4	NC	15	.04 (H Band); .98 (A Band); 4.2 (L Band)
5	NC	16	GND.
6	5.03	17	CLK[a]
7	DATA[a]	18	EN[a]
8	NC	19	.04 (A Band); 6.2 (L,H,U Bands)
9	NC	20	.4 (Low Band); 7.6 (H,A,UBands)
10	NC	21	NC
11	NC	22	NC

[a]

B. Processor Board

Transistors

Transistor	Mode	B	E	C
Q501 (Memory VCC Supply)	Manual Scan	5.03 4.93[a]	5.03 5.03	0 0.66[ß]
Q502 (Keybd. Lamp on-off)	Bright Dim	0.13 0.74	GND. GND.	12.8 0
Q503 (Displ. Bright/Dim Sw.)	Bright Dim	0.73 0.29	GND. GND.	0 36.25
Q504 (Displ. Bright/Dim)	Bright Dim	27.70 36.25	28.40 36.25	28.35 20.65



Integrated Circuits

Pin No.	U501	U502	Pin No.	U501	U502
1	26.4 BR.;18.4 DIM	GND.	21	3.2	NC
2	NC	5.10	22	3.3	UNSQ.:2.56;SQ.:0.36
3	NC	4.85	23	3.35	1.75
4	NC	5.03	24	3.4	2.34 (NO SIGNAL)
5	NC	1.14	25	3.2	MAN.:5.03; SCAN:5.5
6	NC	1.40	26	3.2	0.39 (MANUAL)
7	NC	GND.	27	0.4	0.05
8	18.7	5.03	28	5.0	3.40(MANUAL)
9	10.1	1.3 BR.;2.65 DIM	29		0
10	13.2	0	30		0
11	16.60	U401 ENABLE*	31		0
12	13.4	CLOCK*	32		0
13	GND.	SQ.:0;UNSQ.:3.9	33		U401 ENABLE*
14	GND.	0	34		NC
15	2.75	DATA*	35		5.03
16	0	0	36		5.03
17	18.75	MEM:UNLK=4.92; LOCK=0	37		5.03
18	6.5	SYN.:LOCK=0.59; UNLK=4.95	38		5.03
19	3.0	5.03	39		GND.
20	3.0	GND.	40		5.03

NC=No Connection; a

NOTE: The following abbreviations are used in Table 2.

ABBREVIATIONS

A=Aircraft
BR=Bright
CLK=Clock
D=Drain
DVM=Digital Volt Meter
EN=Enable
FET=Field Effect Transistor
G=Gate
GND=Ground
H=High VHF
L=Low VHF
MAN=Manual
MEM=Memory
S=Source
SQ=Squelch
SW=Switch
SYN=Synthesizer
U=UHF
UNSQ=Unsquelch

REPLACEMENT PARTS LIST

Replacement parts are arranged in tables according to the following scheme.

PCB Assembly	Component Designations	Table No.	Figure No.
Main	1XX, 2XX, 4XX &7XX	3	6A,6B,6C
Control/Display	6XX	4	7
Processor	5XX	5	8
VCO, LHU	3XX	6	9

Miscellaneous items are grouped under Table 7.

Table 3. Main PC Board Assembly (See Figures 6A, 6B, 6C)

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
C101, 120	1538-0479-608	Cap., Tub Cer; 4.7 pF; 50V
C102, 126, 133	1538-0220-608	Cap., Tub Cer; 22 pF; 50V
C103	1510-0010-900	Cap., Mud; 1 pF; 10 V
C104, 112	1517-3345-402	Cap., Trim; 3.0-20pF; Red
C105, 119, 122, 123, 124, 134, 139, 140, 143, 250, 404, 405	1538-0102-601	Cap., Tub Cer; .001 µF; 50V
C106, 111, 128, 130, 131, 137, 142, 144, 146	1539-0472-705	Cap., TM; 4700 pF; 50V
C107	1560-5255-502	Cap., Cd; 68 pF; 50V
C109, 216	1538-0270-608	Cap., Tub Cer; 27 pF; 50V
C110	1538-0471-601	Cap., Tub Cer; 470 pF; 50V
C113	1510-0398-900	Cap., Mud; .39 pF
C114, 115, 121, 241	1538-0181-601	Cap., Tub Cer; 180 pF; 50V
C116	1538-0399-608	Cap., Tub Cer; 3.9 pF; 50 V
C117	1538-0270-508	Cap., Tub Cer; 27 pF; 50 V
C118, 127, 135	1538-0150-508	Cap., Tub Cer; 15 pF; 50V

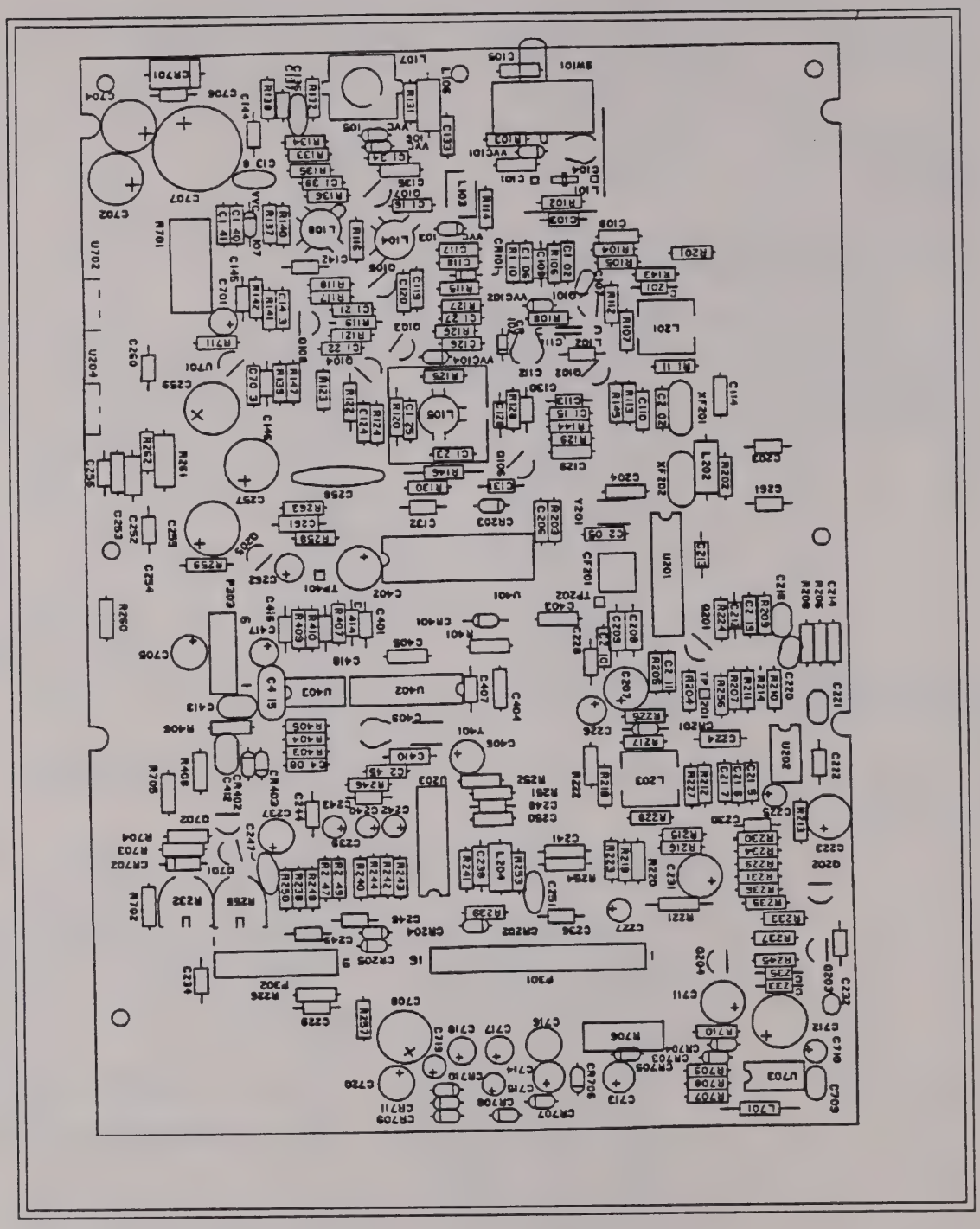


Figure 6A. Parts Placement, Main Board

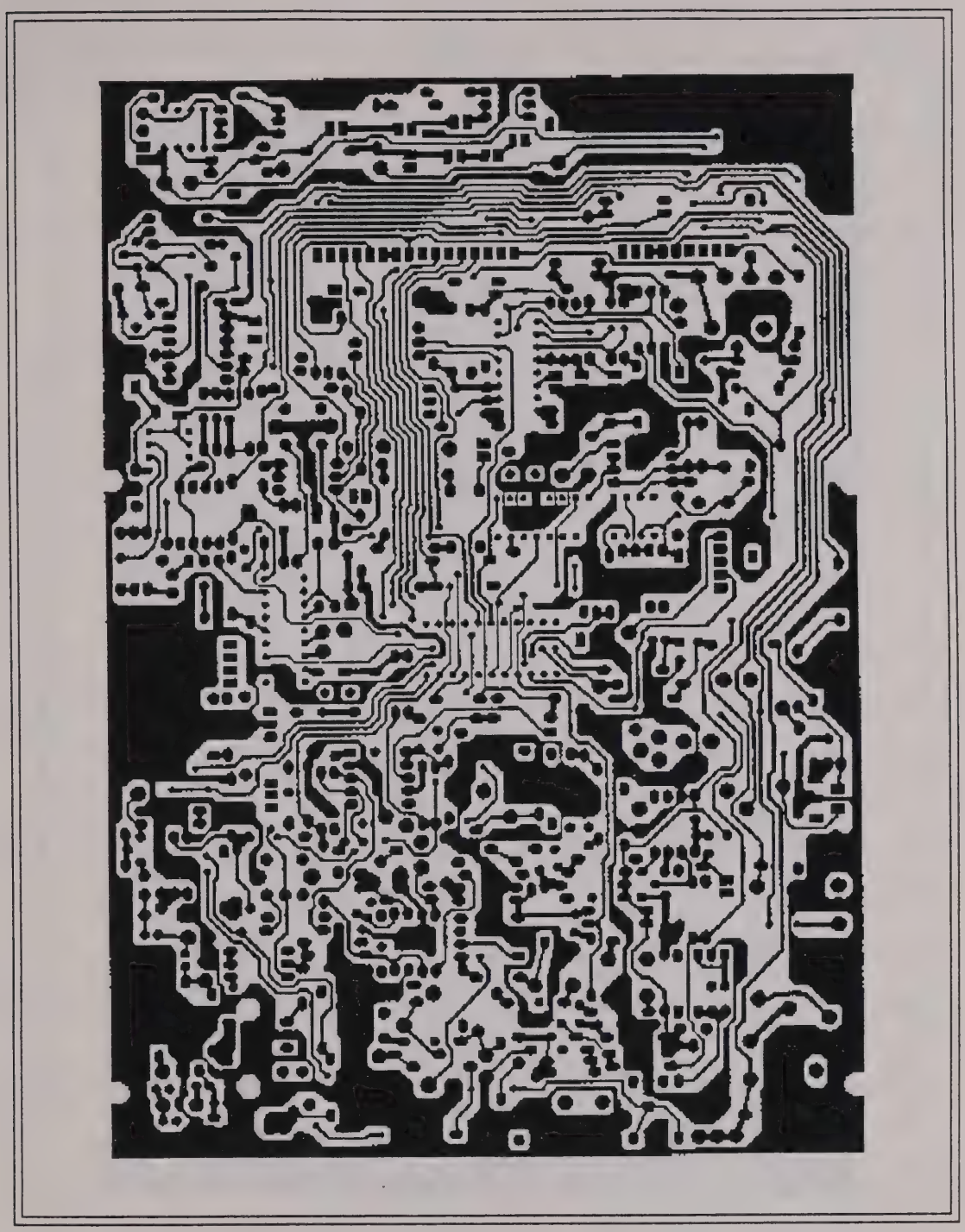


Figure 6B. Main Board, Component Side

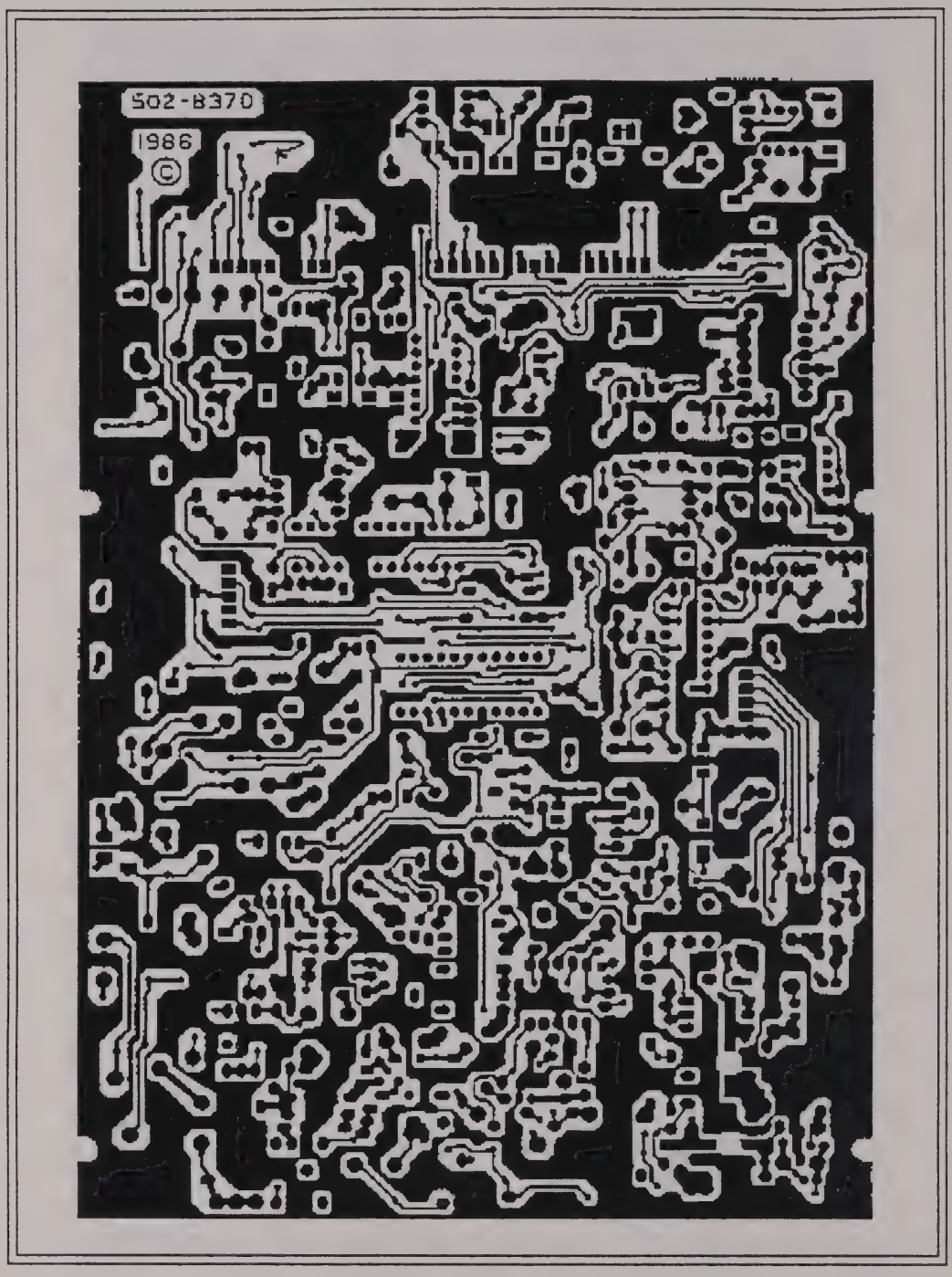


Figure 6C. Main Board, Solder Side

Table 3. Main PC Board Assembly (Continued).

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
C129	1538-0279-608	Cap., Tub Cer; 2.7 pF; 50 V
C132	1513-3254-719	Cap., E; 1 µF; 50 V
C136, 247	1503-0102-003	Cap., Cd; .001 µF; 50 V
C138	1502-0103-006	Cap., Cd; .01µF; 12 V
C145, 201, 2003, 212, 213, 222, 228, 256, 407, 416,	1539-0103-704	Cap., TM; .01 µF; 50 V
C202	1538-0189-708	Cap., Tub Cer; 1.8 pF; 50 V
C204, 211, 215, 217	1538-0151-601	Cap., Tub Cer; 150 pF; 50 V
C205, 210	1538-0680-524	Cap., Tub Cer; 68 pF; 50 V
C206	1539-0224-908	Cap., TM; .22 µF; 50 V
C207, 223, 231, 402, 711	1513-3254-707	Cap., E; 220 µF; 101 V
C208, 209, 224, 238, 252, 261, 703	1538-0223-827	Cap., Tub Cer; .022µF; 16 V
C214	1538-0689-608	Cap., Tub Cer; 6.8 pF; 50 V
C218, 220, 221	1508-0102-510	Cap., MY; .001 µF; 100 V
C219	1539-0681-601	Cap., TM; 680 pF; 50 V
C226, 262	1513-3254-724	Cap., E; 2.2 µF; 50 V
C229, 230, 234, 236, 248, 260	1539-0473-708	Cap., TM; .047 µF; 50 V
C232, 233, 235	1539-0104-706	Cap., TM; .1µF; 50 V
C237, 705	1513-3254-747	Cap., E; 47 µF; 10 V
C240, 710	1513-3254-744	Cap., E; 4.7 µF; 35 V
C241	1538-0220-508	Cap., Tub Cer; 22 pF; 50 V
C242	1513-3254-745	Cap., E; 1 µF; 50 V

Table 3. Main PC Board Assembly (Continued).

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
C243, 245	1538-0473-708	Cap., Tub Cer; 0.047 µF; 50 V
C244, 246, 249,254, 401, 418	1539-0104-706	Cap., TM; .1 µF; 50 V
C251	1523-0151-002	Cap., Cd; 150 pF; 50 V
C253	1538-0222-601	Cap., Tub Cer; 2200 pF; 50 V
C255, 712	1513-3254-711	Cap., E; 220 µF; 16 V
C257	1513-3254-716	Cap., E. 100 µF; 35 V
C258	1502-0474-006	Cap., Cd; .47 µF; 12 V
C259, 702	1513-3254-749	Cap., E; 470 µF; 25 V
C406	1513-3254-730	Cap., E; 100 µF; 10 V
C408	1538-0180-508	Cap., Tub Cer; 18 pF; 50 V
C409	1517-3295-303	Cap., Trim; 6-20 pF; Red
C410	1538-0560-509	Cap., Tub Cer; 56 pF; 50 V
C411	1538-0101-524	Cap., Tub Cer; 100 pF; 50 V
C412	1508-0153-510	Cap., MY; .015 µF; 100 V
C413	1508-0223-610	Cap., MY; .022 µF; 100 V
C415	1508-0823-610	Cap., MY; .082 µF; 50 V
C417	1513-3254-723	Cap., E; 10 µF; 50 V
C701	1513-3254-731	Cap., E; 100 µF; 16 V
C704	1513-3254-748	Cap., E; 470 µF; 10 V
C706	1539-0472-705	Cap., TM; 4700 pF; 50 V
C707	1513-3254-703	Cap., E; 2200 µF; 25 V
C709	1508-0272-610	Cap., MY; 0.027 µF; 100 V
C713, 717	1513-3254-736	Cap., E; 33 µF; 16 V

Table 3. Main PC Board Assembly (Continued).

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
C714, 718	1513-3254-726	Cap., E; 22 µF; 16 V
C715, 719, 225, 227, 239	1513-3254-743	Cap., E; 10 µF; 16V
C716	1513-3254-728	Cap., E; 47 µF; 16V
C720	1513-3254-741	Cap., E; 47 µF; 35 V
CF 201	2700-3209-500	Filter, Ceramic
CR101, 102	4815-3296-601	Diode
CR 201, 202, 203, 204, 205 401, 402, 403, 704, 705, 706, 707, 708, 709, 710, 711	4805-1241-200	Diode, Silicon
CR 701	4806-0000-013	Diode, Silicon
CR702	4808-0000-042	Diode, Zener; 6.8 V
CR703	4808-0000-077	Diode, Zener; 10 V
L101	1800-3160-004	Coil
L102	1800-3160-006	Coil
L103	1803-5125-903	Choke
L104	1800-3152-001	Coil, 3.5 T; Brown
L105	1800-3152-049	Coil, 3.5 T; Orange
L106	1803-3293-801	Choke, Molded, .68 µHy
L107	1800-3283-908	Coil, 14.5 T; Green
L108	1800-3283-904	Coil, 15.5T; Orange
L201	1800-6055-902	Coil, 10mm; 3-150 MHz
L202	1803-3268-201	Choke, 39 µHy

Table 3. Main PC Board Assembly (Continued).

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
L203	1800-6055-801	Coil, 10mm; 455 MHz
L204	1803-3293-811	Choke, 820 µHy
L701	1803-3293-820	Choke, 10 µHy
Q101	4801-0000-029	Transistor
Q102, 106, 108	4801-0000-035	Transistor
Q103, 104, 107	4801-0000-026	Transistor
Q105, 201, 204, 205	4801-0000-005	Transistor
Q202, 203	4801-0000-001	Transistor
Q701, 702	4801-0000-016	Transistor
R102	4704-0821-032	Res., Car Film; 820 K OHM
R103, 110, 114, 126, 132, 133, 138, 249	4704-0393-032	Res., Car Film; 39 K OHM
R104	4704-0562-032	Res., Car Film; 5.6 K OHM
R105	4704-0151-032	Res., Car Film; 150 K OHM
R106, 143, 145, 407	4704-0109-032	Res., Car Film; 1 K OHM
R107, 117, 118, 119, 124, 131, 134, 137, 202, 214, 217, 224, 228, 259, 401, 704, 705, 708	4704-0103-032	Res., Car Film; 10 K OHM
R108, 115, 121, 127, 135, 204, 223, 233, 403, 702, 703, 709	4704-0102-032	Res., Car Film; 1 K OHM
R109, 144, 203,	4704-0330-032	Res., Car Film; 33 K OHM
R111, 120, 123, 211, 212, 230, 237, 244, 406	4704-0223-032	Res., Car Film; 22 K OHM

Table 3. Main PC Board Assembly (Continued).

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
R112, 129, 141, 209, 215, 216, 220, 221	4704-0472-032	Res., Car Film; 4.7 K OHM
R113, 408	4704-0561-032	Res., Car Film; 560 K OHM
R116, 218, 219, 225, 245, 257, 263, 409, 410	4704-0473-032	Res.; Car Film; 47 K OHM
R122, 136, 147, 201, 213, 231, 235, 243, 402, 405	4704-0101-032	Res., Car Film; 100 K OHM
R130, 142, 256	4704-0471-032	Res., Car Film; 470 K OHM
R139	4704-0470-032	Res., Car Film; 47 K OHM
R146, 234, 239, 240	4704-0221-032	Res., Car Film; 220 K OHM
R205, 210	4704-0683-032	Res., Car Film; 68 K OHM
R206	4704-0105-032	Res., Car Film; 1 Meg OHM
R208, 250, 251, 252, 253, 260	4704-0222-032	Res., Car Film; 2.2 K OHM
R226	4704-0123-032	Res., Car Film; 12 K OHM
R227	4704-0333-032	Res., Car Film; 33 K OHM
R229, 236	4704-0332-032	Res., Car Film; 3.3 K OHM
R232, 255	4751-0103-001	Res., Var; 10 K OHM
R238	4704-0181-032	Res., Car Film; 180 K OHM
R241	4704-0823-032	Res., Car Film; 8.2 K OHM
R246	4704-0271-032	Res., Car Film; 2.7 K OHM
R256	4704-0821-032	Res., Car Film; 820 K OHM
R258, 707	4704-0563-032	Res., Car Film; 56 K OHM
R261	4704-0221-034	Res., Car Film; 220 K OHM

Note: All resistors are 1/4 watt unless otherwise noted.

Table 3. Main PC Board Assembly (Continued).

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
R262	4704-0479-032	Res., Car Film; 4.7 K OHM
R404	4704-0822-032	Res., Car Film; 8.2 K OHM
R701	4710-0150-041	Res., WW; 15 K OHM; 2 W
R706	4710-0240-041	Res., WW; 24 K OHM; 1W
R710, 711	4704-0100-032	Res., Car Film; 10 K OHM
TP201, 202, 401	2107-0000-002	Contact Pin. Test Point
U201	3130-6056-502	IC; IF Subsystem
U202	3130-3167-909	IC; OP Amp
U203	3130-3193-512	IC; IF Amp
U204	3130-5407-602	IC; Audio
U401	3130-3296-802	IC; Band Switch
U402	3130-6181-801	IC; PLL Pre-scaler
U403	3130-3167-917	IC; OP Amp
U701	3130-0000-021	IC; 8V Regulator
U702	3130-0000-022	IC; 5V Regulator
U703	3130-3167-910	IC; DC DC Converter
VVC101, 102	4809-0000-012	Diode, Varactor
VVC103, 104, 105, 106, 107	4809-0000-008	Diode, Varactor
XF201, 202	2705-3232-200	Filter, Crystal; 10.7 MHz
Y201	2301-3151-601	Crystal, 10.245 MHz

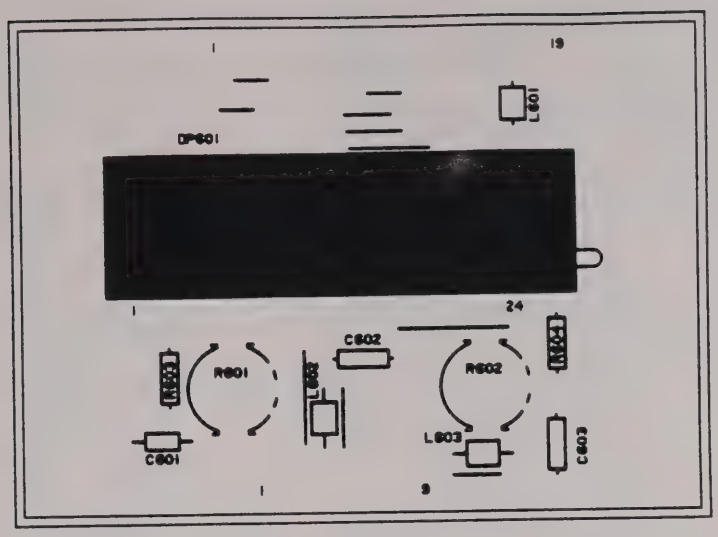
Table 3. Main PC Board Assembly (Continued).

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
Y401	2338-3300-502	Crystal, 12.8 MHz
	2105-3299-205	Conn, 9 Pos.
	2105-3299-207	Conn, 16 Pos.
	2105-3299-211	Conn, 6 Pos.
	2508-1296-000	Shield, Can.
	2508-1307-200	Shield, Recvr. Board
	2508-1288-900	Shield, Can.
	5113-5155-201	SW, slide
	6001-1319-700	Cable
	6042-0000-007	Cable

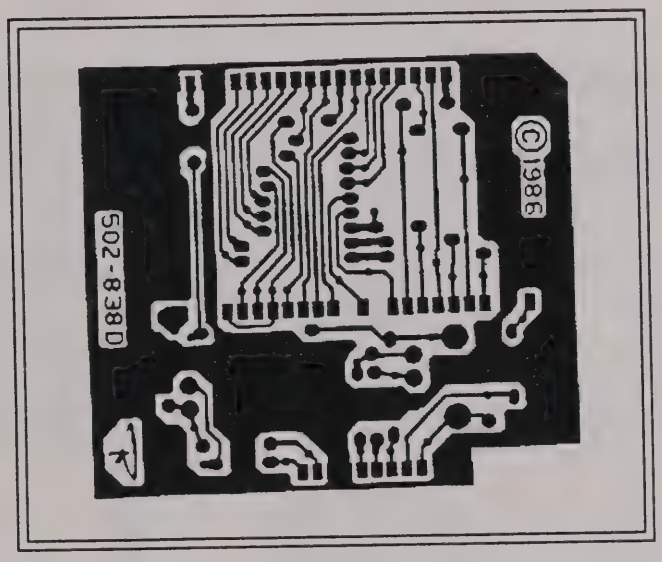
Table 4. Control/Display PC Board Assembly. (See Figure 7.)

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
C601	1539-0103-704	Cap., TM; .01 µF; 50 V
C602, 603	1538-0102-601	Cap., Tub Cer; .001 µF; 50 V
DP601	2000-5260-801	Display, 6-digit
L601, 602, 603	2502-3293-901	Ferrite, Bead; w/lead
R601 (ON/OFF-Volume)	4750-5194-601	Res., Var; 10 K w/switch
R602 (Squelch)	4750-5194-704	Res., Var; 10 K
R603	4704-0100-032	Res., Car Film; 10 K OHM
R604	4704-0121-032	Res., Car Film; 120 K OHM
	2811-3185-600	Screw; 4 x 1/4; Qty. 4
	2816-3229-601	Plascrew, 5 x 3/8
	6008-3300-030	Cable, 19 Cond
	6008-3300-032	Cable, 9 Cond
	2501-3450-100	Bushing, Switch Support
	1400-7088-901	Bracket, Front Panel
	1411-6065-402	Bulb, Panel
	1411-7089-002	Panel, Front
	1700-6134-201	Circuit Flex, Keyboard
	2001-7089-102	Keyboard
	2402-6182-202	Knob, Ring Assy; Qty. 2
	2808-0250-030	Screw, Pushtite; 4 x 1/4; Qty. 5

Note: All resistors are 1/4 watt unless otherwise noted.



COMPONENT SIDE



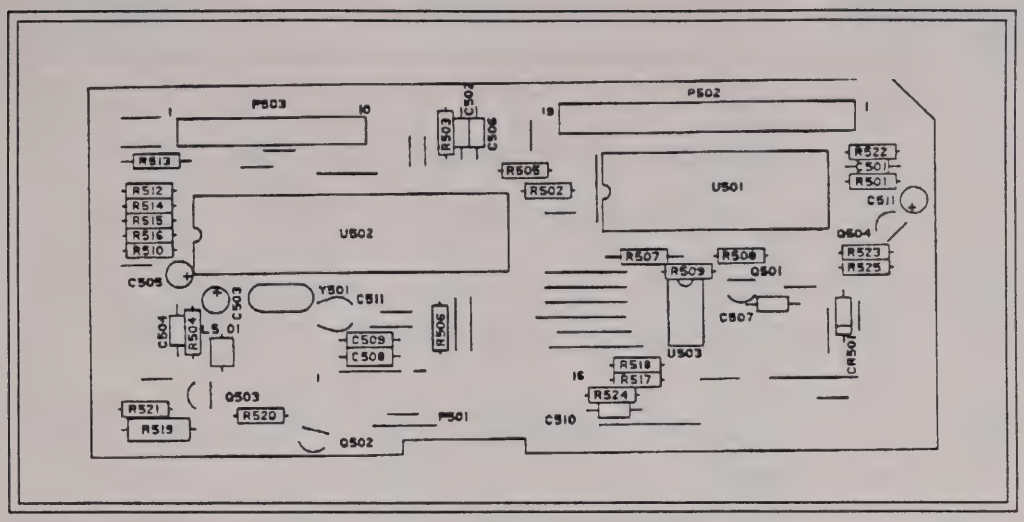
SOLDER SIDE

Figure 7. Parts Placement, Control/Display Board.

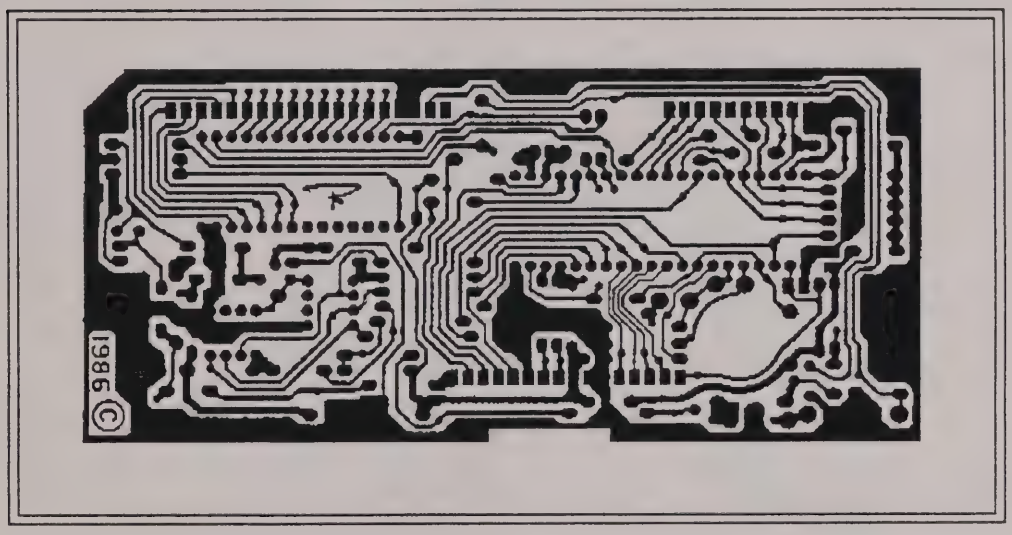
Table 5. **Processor PC Board Assembly. (See Figure 8.)**

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
C501, 502, 506, 507, 510	1539-0103-704	Cap., TM; .01 µF; 50 V
C503, 511	1513-3254-744	Cap., E; 4.7 µF; 35 V
C504	1539-0104-706	Cap., TM; .1 µF; 50 V
C505	1513-3254-743	Cap., E; 10 µF; 16 V
C508	1538-0560-509	Cap., Tub Cer; 56 pF; 50 V
C509	1538-0330-508	Cap., Tub Cer; 33 pF; 50 V
CR501	4808-0000-047	Diode, Zener; 12 V
Lamp 501	3901-3602-701	Lamp/Holder Assy
L501	2502-3293-901	Ferrite, Bead; w/ lead
Q501, 504	4801-0000-001	Transistor
Q502, 503	4801-0000-005	Transistor
R501	4704-0100-032	Res., Car Film; 10 K OHM
R502, 522	4704-0223-032	Res., Car Film; 22 K OHM
R503	4704-0123-032	Res., Car Film; 12 K OHM
R504	4704-0683-032	Res., Car Film; 68 K OHM
R505, 506, 509, 510, 511, 512, 513, 514, 515, 516	4704-0103-032	Res., Car Film; 10 K OHM
R507, 508, 524	4704-0152-032	Res., Car Film; 1.5 K OHM
R517	4704-0222-032	Res., Car Film; 2.2 K OHM
R518	4704-0681-032	Res., Car Film; 680 K OHM

Note: All resistors are 1/4 watt unless otherwise noted.



COMPONENT SIDE



SOLDER SIDE

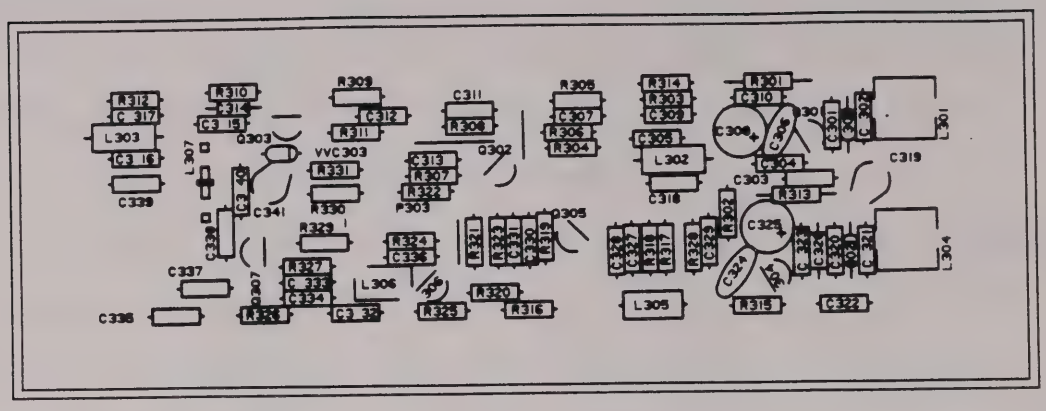
Figure 8. Parts Placement, Processor Board.

Table 5. Processor PC Board Assembly (Continued).

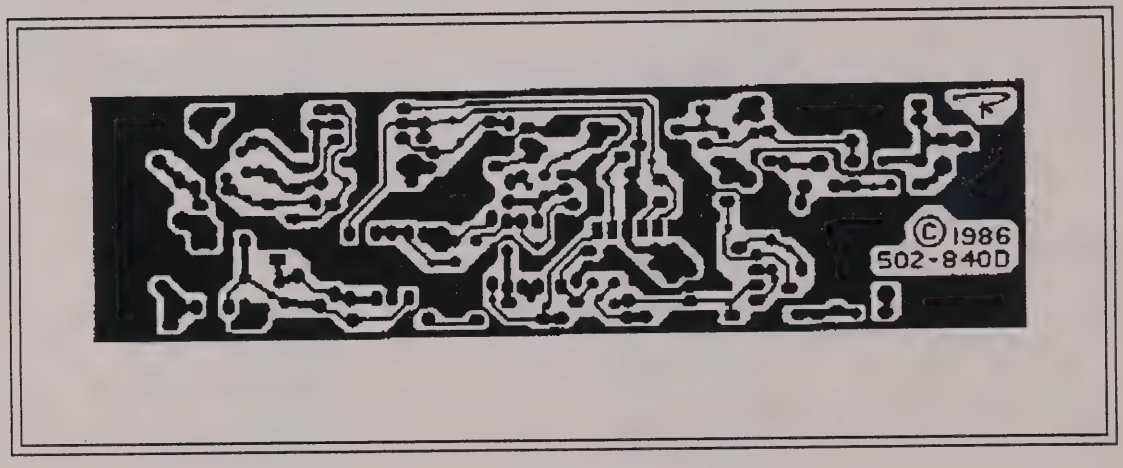
ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
R519	4711-0680-049	Res., WW; 68 K OHM; 1 W
R520	4704-0821-032	Res., Car Film; 820 K OHM
R521	4704-0563-032	Res., Car Film; 56 K OHM
R523	4704-0333-032	Res., Car Film; 33 K OHM
R525	4704-0102-032	Res., Car Film; 1 K OHM
U501	3130-3297-603	IC; Display Driver
U502	3130-6179-903	IC; Microprocessor
U503	3130-3359-804	IC; EAROM
Y501	2342-3360-001	Crystal, 4.194304 MHz
	2105-3286-402	Conn, 10 Circuit
	2105-3299-209	Conn, PC; 19 PIN
	6008-3300-031	Cable, 16 Cond.

Table 6. VCO-LHU PC Board Assembly. (See Figure 9.)

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
C301, 303, 309, 311, 331	1538-0471-601	Cap., Tub Cer; 470 pF; 50 V
C302	1538-0109-724	Cap., Tub Cer; 1 pF; 50 V
C304	1538-0689-608	Cap., Tub Cer; 6.8 pF; 50 V
C305, 313, 318	1538-0102-601	Cap., Tub Cer; .001 µF; 50 V
C306	1500-0330-505	Cap., Cd; 33 pF; 500 V
C307, 310, 312, 314	1539-0103-704	Cap., TM; .01 µF; 50 V
C308, 325	1513-3254-707	Cap., E; 220 µF;
C315, 317, 328	1538-0101-524	Cap., Tub Cer; 100 pF; 50 V
C316	1538-0180-608	Cap., Tub Cer; 18 pF; 50 V
C319, 341	1517-3295-303	Cap., Trim; 6-20 pF; Red
C320, 327	1538-0150-508	Cap., Tub Cer; 15 pF; 50 V
C321	1538-0279-608	Cap., Tub Cer; 2.7 pF; 50 V
C322	1538-0221-601	Cap., Tub Cer; 220 pF; 50 V
C323, 333, 338	1538-0479-608	Cap., Tub Cer; 4.7 pF; 50 V
C324	1500-0150-550	Cap., Cd; 15 pF; 50 V
C326	1510-0478-900	Cap., Mud; .47 pF
C329, 336	1538-0181-601	Cap., Tub Cer; 180 pF; 50 V
C330	1538-0220-508	Cap., Tub Cer; 22 pF; 50 V
C332	1538-0151-601	Cap., Tub Cer; 150 pF; 50 V
C334	1538-0100-508	Cap., Tub Cer; 10 pF; 50 V
C335	1538-0399-608	Cap., Tub Cer; 3.9 pF; 50 V
C337	1538-0120-508	Cap., Tub Cer; 12 pF; 50 V



COMPONENT SIDE



SOLDER SIDE

Figure 9. Parts Placement, VCO - LHU Board.

Table 6. VCO-LHU PC Board Assembly (Continued).

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
C339	1538-0229-608	Cap., Tub Cer; 2.2 pF; 50 V
C340	1538-0159-724	Cap. Tub Cer; 1.5 pF; 50 V
L301	1800-5149-716	Coil, 10mm; 10.5T; Red
L302, 305	1803-3268-208	Choke, 1.8 µHy
L303	1803-3268-203	Choke, .110 µHy
L304	1800-5149-717	Coil, 10mm; 2.5T; Blue
L306	1803-5125-913	Choke, 7.5T
L307	1800-3255-201	Coil, RF, INPUT; 450 MHz
Q301, 304	4811-0000-020	JFET
Q302, 303, 305, 306	4801-0000-035	Transistor
Q307	4801-3603-301	Transistor
R301, 313, 331	4704-0393-032	Res., Car Film; 39 K OHM
R302, 315	4704-0105-032	Res., Car Film; 1 Meg OHM
R303, 328	4704-0181-032	Res., Car Film; 180 K OHM
R304	4704-0471-032	Res., Car Film; 470 K OHM
R305	4704-0223-032	Res., Car Film; 22 K OHM
R306	4704-0472-032	Res., Car Film; 4.7 K OHM
R307, 310, 320, 322, 323	4704-0101-032	Res., Car Film; 100 K OHM
R308, 316, 319, 325	4704-0221-032	Res., Car Film; 220 K OHM
R309	4704-0104-032	Res., Car Film; 100 K OHM
R311, 312, 329, 330	4704-0331-032	Res., Car Film; 330 K OHM

Note: All resistors are 1/4 watt unless otherwise noted.

Table 6. VCO-LHU PC Board Assembly (Continued).

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
R314, 317, 318, 321	4704-0103-032	Res., Car Film; 10 K OHM
R324	4704-0163-032	Res., Car Film; 16 K OHM
R326	4704-0470-032	Res., Car Film; 47 K OHM
R327	4704-0154-032	Res., Car Film; 150 K OHM
VC301, 302	4809-0000-008	Diode, Varactor
VC303	4809-0000-012	Diode, Varactor
	2800-1325-701	Spcr, Thd; 6-32 x 1/4
	2807-3298-001	Screw, 6-32x1/4
	6042-0000-007	Cable, Coax; RG-316/u
	6008-3300-033	Cable, 6 Cond.

Table 7. Miscellaneous Items.

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
	Ant. Hardware Kit Assy (7011-1415-000)	
	2104-5140-002	Grip-Antenna Plug
	4101-1479-001	Bag, 3.5x4
	Chassis Riveted Stacked Assy (7025-1559-800)	
	1403-7096-505	Chassis, TS-1
	2104-3221-900	Plug, Coax
	2105-0000-005	Conn, Ant. Socket
	2880-0156-001	Rivet, 088x5/32; Qty. 2
	2882-0187-001	Rivet, 125x3/16; Qty. 4
	Others	
	1100-6179-705	Transformer, AC; Wall Adptr.
	1201-5108-801	Ant., Telescopic
	4101-0000-001	Bag, 10x5x18x.0015 THK
	6041-3398-401	Cord, DC; w/ Inline 1.5A fuse
	7001-1556-600	Owner's Manual, TS-1
	2104-1325-901	Plug, Button Hole; Qty. 2
	2811-3416-500	Screw, Qty. 2
	2840-3191-909	Washer, .058 TH; Qty. 2

Table 7. Miscellaneous (Continued).

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
	2844-6070-701	Washer, Anti-Rotational; Qty. 2
	1400-6074-000	Bracket, Mtg
	1402-3291-2202	Foot, Rubber; Qty. 4
	1411-7053-012	Case, Blk
	2402-5291-202	Knob, Insert Assy; Qty. 2
	2506-6076-400	Cover, Chassis
	2808-0250-034	Screw, 4x1/4; Qty. 10
	2809-0375-012	Screw, 6x3/8
	2816-3298-702	Plascrew, No. 6; Qty. 4
	2101-3262-400	Phono Jack; 3.5mm
	2803-0312-001	Screw; 4-40x5/16; Qty. 2
	2807-3298-001	Screw, 6-32x1/4; Qty. 10
R1	4704-0681-032	Res., Car Film; 680 K OHM

Note: All resistors are 1/4 watt unless otherwise noted.

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